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ABSTRACT

An overview is provided of the methods used by the Forest Park campus of St. Louis Community College (SLCC) to plan and develop a local area network (LAN) for administrative microcomputers. The first three sections provide brief descriptions of the SLCC District, SLCC, and the Forest Park campus. Section IV looks at the organization of administrative data processing (ADP) on the campus and the functions of the committee established at the college to provide a plan for the growth of ADP. Next, section V lists the major accomplishments of the ADP committee. Section VI sets forth the definition and purpose of LANs as continually interconnected systems of computers and peripherals serving a small geographic area within one organization, which permits the users to share data, programs, and services. In section VII, network elements are identified (e.g., microcomputers, topology, network transmission medium, and network interface card). In section VIII, the advantages of an LAN are specified, including resource sharing, hardware interconnectability, improved data handling, rapid data transfer, and added value services. Section IX presents a series of questions to be considered in determining the need for an LAN, while section X identifies issues related to the process of developing specifications for an LAN (e.g., the physical configuration of the system, expansion requirements, network interconnect requirements, data transfer rates, performance requirements, redundancy in cabling, and warranty and maintenance agreements). Final purchasing questions, cautions, and concerns about the long-term future of the LAN are presented in the concluding sections. (EJV)

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Planning for the Administrative Microcomputer Local Area Network

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St. Louis Community College at Forest Park

Planning for the Administrative Microcomputers
Local Area Networks (LAN)

I. Introduction

The St. Louis Community College District was organized in 1963 to serve the metropolitan St. Louis area with a population of approximately 2 million people.

The Community College District is one of 16 institutions of higher education in the metro area that provides educational services to 90,000 students taking credit courses.

II. Institutional Overview

St. Louis Community College was organized in 1963 and since that time has provided educational opportunities to over 400,000 area residents at its three campus locations and numerous satellite facilities. The College offers both credit and non-credit courses.

The College is supported by a local tax levy, State aid and student fees. Currently over 30,000 students are enrolled in credit courses at the College.

Data processing services to support administrative operations such as admission, registration, billing and receiving, payroll and personnel are provided by a central data systems department which currently operates an IBM 4381.

III. Campus Overview

Forest Park is one of the three campuses of the College located on the western edge of the City of St. Louis with an enrollment of approximately 7,000 students in college transfer and 40 career curriculums.

IV. Administrative Data Processing (ADP) Organization and Responsibility

The Forest Park campus went on line in September of 1979 with a student admissions/registration system. Initial use of the system was confined to the Admission, Registration and billing areas. The system continued to expand and in order to provide some plan for this growth the Administrative Data Processing Committee was organized in August 1982. The Committee consists of four individuals representing the Instructional, Student Services and Business Services divisions of the campus with a data processing individual serving as a technical consultant.

The Committee was formed as a result of two developments: The accelerated and increased use of electronic data processing systems and applications to perform varied administrative tasks on the Forest

Park Campus and the district-wide decision to transfer the financial and administrative responsibility for the majority of data processing equipment from the central data systems staff to campus personnel.

Committee Goals are:

1. To provide to the administrative offices the types and quantities of equipment necessary to perform the required task

2. To centralize the budgetary and record-keeping functions for all ADP equipment in one office with one account to provide more accountability

3. To provide equipment which is standard to avoid the need for training personnel to operate multiple equipment models

4. To avoid the creation of computing centers and software applications whose primary reason for existence is to satisfy the personal needs of the user to control their own unique system when standard systems are available and adequate

5. To provide for planned growth

6. To consolidate leases and maintenance agreements in order to streamline the ADP network

7. To develop priorities for the implementation of data processing equipment

8. To review all administrative data processing proposals and make recommendations to the president

9. To review and analyze future ADP needs

10. To serve as liaison with the college-wide data systems staff and with vendors to coordinate contracts, maintenance and planning

V. History of Administrative Data Processing Accomplishments

In the three years of its operation the Administrative Data Processing Committee has been very active. Among its major accomplishments are:

1. Development of a short-term plan - 1 year

2. Development of a long-range plan - 3 years

3. Survey of user needs

4. Inventory of all equipment

5. Coordinate request for system access (security system)

6. Coordinate service requests

7. Organized training programs

8. Questionnaire on PC application to user group

9. Equipment evaluation - user input and purchase

10. Initial evaluation of need for and placement of PC dedicated to administrative use

VI. Definition and Purpose of LAN

LAN - a continually interconnected system of computers and peripherals serving a small geographic area within one organization

Purpose: to permit users to share

- Data
- Programs
- Services

This differs from a mainframe in that in an LAN every work station is a CPU so processing is distributed

Advantages:

- Crash of LAN does not halt processing
- Each user controls his own processing
- No need for central implementation
- Crash of CPU does not stop processing when you have down-loaded data (e.g., registration periods)

VII. Network Elements and Relationship to Mainframe

The LAN provides the opportunity to take advantage of the large amount of information stored in the mainframe but eliminates two of the major problems: the LAN user can download data and thus does not have to be concerned with system response time since they control their own data; if the desired information has been downloaded, any down time experienced by the mainframe does not present a problem.

The LAN user can also have access to the power of the mainframe if that is needed to handle large volumes of data.

Advantages:

- Access to mainframe data
- Access to large computing capabilities of mainframe
- Avoid problem of access when mainframe is down
- Avoid delays in response time during peak demand on mainframe

Network Elements:

- Micro computers

- Topology

  BUS/Tree - linear line you tap to add units

  Star - central node - faster transmission, cleaner, much more cabling since you must go back to central node

  Starburst - you can add a Hub, an existing line and then add additional units off each hub

  Ring - weak alternative; if the ring is broken service is lost (some systems will install double ring)

- Network BUS - Transmission Medium

  Ribbon Cable

  Twisted Pair - more durable

  Coaxial Cable - built-in shield

  Optical Fiber - hard to work with

  Infraray Beam - high cost

- Network Interface Card

  Connects device to Network topology

  A high-cost item ($500.00 to $800.00 per unit)

  Interface card is built to operate on a particular transmission protocol

  The Network is like a party line phone:

  1. Polling

  2. Collision detection

  3. Token - passing- electronic signal called token - all stations ask each other in rotation for clearance; no collision or detection occurs

- File Servers

  Allows different micros and operating systems to access and share files

- Print Servers

  Allows different micros to route print request to local printers

or directed to a printer attached to another system unit on the network - provides queue management functions

- Gateway Servers

Serves as the communication gateway with host computers. Multiple gateways can be used to provide communication with one or more host computers

IIX. Advantages of an LAN

There are a number of distinct advantages accrued to the institution and the user as a result of the installation of the local area network. The advantages include:

- Resource & Sharing
- Hardware Interconnectability
- Improved Data Handling
- Rapid Data Transfer
- Added Value Services

1. Resource & Sharing: The LAN permits individual offices to share hardware, software, and data among the various users.
2. Hardware Interconnectability: A well-designed network handles clearly stated applications, but provides for the connection of a wide range of hardware components made by various manufacturers.
3. Improved Data Handling: Since data is transferred electronically through a local area network, errors and misdirected data that routinely accompany hardcopy data distribution are eliminated.
4. Rapid Data Transfer: Data entered through a local area network is instantly available to authorized network users.

5. Added Value Services: In addition to the information normally available from file servers and information sharing, networks frequently accommodate activities such as bulletin boards, calendars, electronic mail, etc. Normally microcomputers hooked into a network can also accommodate stand-alone software applications unique to the needs of a specific office.

IX. Determining the Need for an LAN

How do you determine whether or not your institution needs a local area network?

Not unlike our experiences with microcomputers, it appears that owning a network in many cases has become a status symbol. Therefore, it becomes extremely important that an institution carefully analyze and plan its networking needs. Careful and accurate planning may be the most critical element in the process of installing a local area network.

It is imperative that you know your networking goals and needs before you invest in LAN technology. Careful planning should address the following steps:

1. What are the specific needs and applications to be addressed?
2. Who are your primary and future users?
3. How will the staff be trained to use the network effectively?

4. Who is responsible for training?
5. Are end-user needs, network software, and mainframe software compatible?
6. Who is responsible for managing network, hardware, software, and maintenance?
7. What are the basic operational ground rules adopted by the institution, that guide network activities?
8. Will the network handle the traffic load generated by the number of peripherals and applications?
9. What level of data volume must the system support?
10. Will the system accept a reasonable rate of growth?
11. Will the planned network stand alone or interconnect with other networks?
12. How will you use the LAN?
13. Which software products do you plan to utilize?
14. What is the inventory of available devices?
15. What limitations, if any, are imposed by external communications' services?
16. What kind of devices, present and future, will be attached to the network?
17. Based upon projected need, how many additional devices will be required to support network activities?
18. Will the network interface with a mainframe computer?
19. What type of communications' devices are required for the network to function?

20. What impact will remote input and output devices have on the operating efficiency of the network?
21. Does the system allow for a reasonable level of flexibility to accommodate user addition/deletion or relocation?
22. What is the estimated cost and savings associated with the installation of the network?
23. How will the network operations be evaluated?

X. Specifications for the LAN

After the need for acquiring a network has been determined and the plan well developed, the task of developing detailed specifications must be undertaken. Unless you are a data systems specialist, the details and terminology required for developing accurate specifications can be a laborious and frustrating task. If you do not possess the skills to develop these detailed specifications, I would suggest that you employ the assistance of a knowledgeable member of the staff within your institution or hire an outside consultant.

There are a number of significant issues which should be considered in the process of developing specifications. Some of these issues are as follows:

1. The physical configuration (topology) of the system
2. Expansion requirements
3. Network interconnect requirements
4. Data transfer rates

5. Performance requirements
6. Redundancy in cabling if necessary
7. Data backup system
8. Data storage capacity
9. Cable run length requirements
10. Levels of security required
11. Collision detection/avoidance
12. Utility programs
13. Component maintenance without system interruption
14. System warranty period
15. Maintenance agreements

XI. Decision to Purchase

You have now reached the stage in the process where the decision must be made "to buy or not to buy." You may find yourself encountering questions such as:

- Will the plans and specifications really insure delivery of the system which will meet our needs?
- Will the products of this system really justify the cost of the system?
- What if a month after the system is installed, a new product is announced that will do a better job for less money?

XII. Cautions

I cannot answer the above questions for your institution.

I'm not sure I can answer the above questions for my own institution. I can, however, identify some cautions for you to consider in reaching a decision to purchase a local area network. I suggest you consider the following:

1. Carefully monitor the literature to get a feel for what is developing in the market place.
2. Be sure that the design of the system truly reflects institutional user needs.
3. Design a system and specification which allows for maximum system flexibility to accommodate change and/or expansion.
4. Double check the ability of the system to handle planned application software.
5. Acquire vendor assurance that software is multi-user, network compatible.
6. Know the limits of software licensing.
7. Be cautious about the "black box" solutions proposed by many vendors.

XIII. The Future of the Network

In conclusion, it appears that computer networks will play a prominent role in educational institutions in the immediate future. There are questions, however, about the future of the network with regard to the long-term plan. We constantly hear rumors about systems currently under development which will revolutionize the workplace. Are these rumors true? Who will announce the breakthrough? When will it happen?

I realize that the rapid change in computer technology can be very disconcerting. Many of us are trying to remain reasonably current in this field, while managing the day-to-day affairs in our offices. At some point, however, an institution must weigh the liabilities and the benefits facing them and make the decision "to buy or not to buy."

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